

ART. VIII.—*Two New Species of Coptotermes Wasmann*
(Isoptera).

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[Read 11th July, 1929; issued separately 31st October, 1929].

This paper presents descriptions of two new species of *Coptotermes*, one from the Celebes and the other from the Solomon Islands. The method, recently proposed by the senior author (Light, 1927), of expressing characters of proportion in the form of indices justifies this addition to the already extensive list of *Coptotermes* species based on the soldier caste. It is believed that this method provides an exact and easily used means of differentiating such species and gives promise of resolving in great part the chaotic state of the taxonomy of certain termite genera.

The measurements and indices are those proposed by the senior author (Light, 1927). In addition the inclination of the fontanel and the fontanel aperture index are used as defined by the junior author (Davis, 1929).

COPTOTERMES FROGGATTI, sp. nov.

Diagnosis.

Alates unknown.

Soldier.—Head index, 0.79; head contraction index, 0.70; gular index, 2.46; gular contraction index, 0.629; maximum breadth index, 2.01; minimum breadth index, 3.19; fontanel aperture index, 0.639; angle of inclination, 29° to 31°; pronotal index, 2.00.

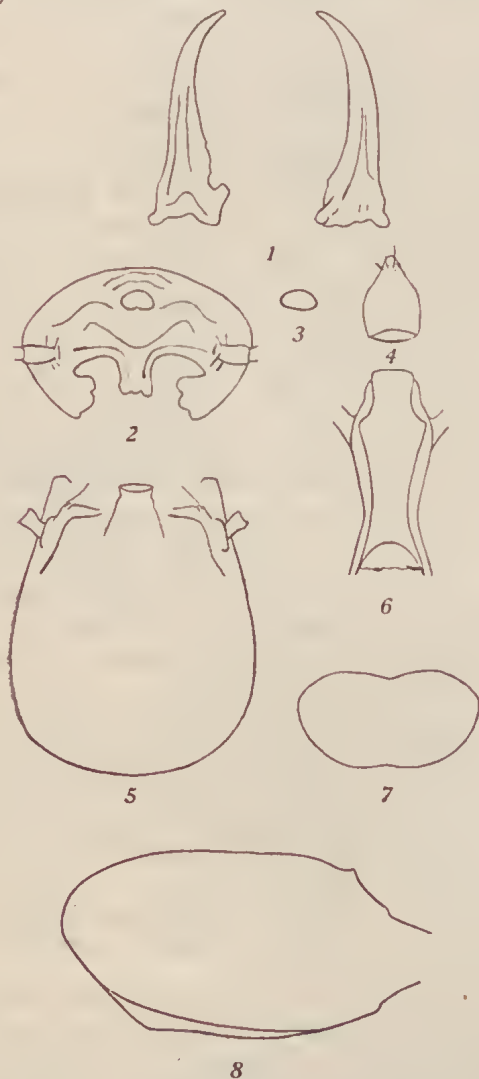
Description.

Soldier.—Head orange-yellow, darker along anterior margin, broadly rounded behind, widest at basal two-fifths, thence converging regularly to the articulation of the mandibles; evenly rounded when viewed from either end as in cross section, flattened dorsally as viewed in profile (Figs. 5 and 8). Fontanel prominent, aperture large, with a rather heavy rim of brown chitin, angle of inclination of from 29° to 31° from the vertical (Fig. 8). In about 85% of the specimens at hand the anterior (lower) margin of the aperture is raised in a small tooth in the mid-line, giving the opening a heart-shaped outline (Fig. 2). (This tooth is disregarded in measurements.) In the remainder the lower edge is straight (Fig. 3).

Mandibles red-brown or blackish, pointed, curved at tip, cutting edges smooth except near the base. Left mandible with

basal tooth conspicuous, quadrate, and with three or four minute denticles immediately anterior to it; right mandible lacking teeth (Fig. 1).

Labrum roundedly triangular, widest at about middle, two stiff, erect bristles at apex, dorsally. Hyaline tip distinct, rounded at apex (Fig. 4).



FIGS. 1—8. *Coptotermes froggatti* sp. nov. $\times 24$.

1. Mandibles, dorsal view; 2. Antero-dorsal view of head, showing location and usual shape of fontanel aperture; 3. Shape of fontanel aperture in the minority of specimens; 4. Labrum, dorsal view; 5. Head, dorsal view; 6. Gula, ventral view; 7. Pronotum, dorsal view; 8. Head, profile view.

Rim of each antennal fovea heavy, arising abruptly posteriorly, sloping inward anteriorly. Median to this, at its anterior fourth, a ridge arises, runs forward and medially to a point about two-fifths of the distance to the anterior angle of the head. There it is interrupted, turns inward at an angle of about 120° , and ends near the edge of the fontanel ridge. Immediately within this is another smaller ridge, the angle of which is less sharp, and which terminates posterior to the antennal fovea (Fig. 5).

The antennae of all specimens are broken, the longest being of but 13 joints. Basal joint about twice as long as wide, widest at anterior end, very slightly constricted at middle. Joint II about half the diameter and one-third the length of the basal joint, nearly square in profile. Joint III one-half the length of II and somewhat less in diameter. Joint IV equal to II in diameter, but somewhat shorter. Joint V equal to II in length. Joints VI and VII pear-shaped or round, longer and greater in diameter, remaining joints successively increasing in diameter.

Gula widest at anterior third, squarely truncate anteriorly, lateral angles very round, lateral rim wide (Fig. 6).

Pronotum pale creamy yellow, saddle-shaped, widest just behind the apical third. Anterior emargination shallow, usually round at bottom; anterior margin on each side broadly rounded to a rather sharp lateral angle, thence the margins converge in a regular curve to the posterior margin; posterior emargination almost non-existent, there being but a slight median sinuation (Fig. 7). Three or four long stiff bristles and a number of shorter ones dorsally on the anterior margin; a few stiff bristles near the posterior margin and scattered irregularly over the disc.

Meso and metathoracic segments dorsally with sparse bristles, especially toward the lateral margins.

Abdomen dirty white in color, first and second segments dorsally with several bristles on either side of the mid-line and a few on the sides; third with only three or four bristles near mid-line, but more at sides, succeeding segments to ninth with few or no hairs; ninth and terminal segments sparsely clothed with fine, posteriorly-pointing hairs. Styles conical, 3-jointed, with long bristles, especially on basal joint.

Described from 14 soldiers collected by W. W. Froggatt at Banika, Russel Group, Solomon Islands, April 13th, 1913. No. 89S in collection of senior author.

There are a number of workers present, but, as this is a mixed collection containing workers of at least two species, it is not thought wise to attempt to determine the worker of this species until more definite data can be obtained.

This species has been named for Mr. W. W. Froggatt, whose contributions to the classification of the termites, particularly those of Australia, are too well known to need recounting here.

Coptotermes froggatti seems most closely related to *C. acinaciformis* Froggatt of Northern Australia. The two species differ

significantly, among other points, in the shape of the gula and the head as brought out in the table below by their gular contraction indices and head contraction indices.

MEASUREMENTS AND INDICES.

(Of Soldiers of *Coptotermes froggatti*, sp. nov.).

	Indices	Measurements (in millimeters)		
		Maximum	Minimum	Average
Head				
length	—	1.613	1.557	1.581
length to fontanel	—	1.565	1.493	1.513
maximum breadth	—	1.294	1.198	1.256
minimum breadth	—	0.910	0.856	0.883
index	0.791	—	—	—
contraction index	0.703	—	—	—
Gula				
length	—	0.923	0.814	0.890
maximum breadth	—	0.463	0.415	0.443
minimum breadth	—	0.297	0.267	0.279
average breadth	0.361	—	—	—
index	2.16	—	—	—
contraction index	0.629	—	—	—
maximum breadth index	2.009	—	—	—
minimum breadth index	3.190	—	—	—
Head length divided by				
maximum gular breadth	3.568	—	—	—
minimum gular breadth	5.666	—	—	—
average gular breadth	4.380	—	—	—
gular length	1.776	—	—	—
Fontanel				
length	—	0.125	0.112	0.115
breadth	—	0.193	0.171	0.180
angle of inclination	29°-31°	—	—	—
aperture index	0.639	—	—	—
Labrum				
length	—	0.407	0.303	0.351
length with hyaline tip	—	0.439	0.335	0.381
maximum breadth	—	0.343	0.315	0.320
Pronotum				
maximum length	—	0.521	0.489	0.502
minimum length	—	0.473	0.431	0.456
maximum breadth	—	1.022	0.926	0.958
index	2.000	—	—	—
Length of hind tibia	—	1.159	1.089	1.118
Total length of insect	—	—	—	5.3

Indices of proportion are not available for the other *Coptotermes* species known from the Solomon Islands, but Snyder's measurements (Snyder, 1925) indicate that *C. froggatti* is considerably larger than *C. panuae* Snyder and smaller than *C. grandiceps* Snyder and *C. solomonensis* Snyder. From *C. dobonicus*, a new Guinea species of somewhat the same size, *C. froggatti* shows numerous differences of proportion as brought out by the indices given below.

The question of the relationship of *C. froggatti* to the species described by Hill (1927) in his recent article on Termites from the Australian Region, received as this was ready for press, must rest until further data concerning these species are available or a comparison possible. *C. remotus* is unquestionably very different, its smaller size distinguishing it at once. So far as Hill's measurements indicate, *C. obiratus* Hill is nearer *C. froggatti* than is *C. solomonensis* Hill. The material on which *C. froggatti*, sp. nov. and *C. solomonensis* Hill are based was collected by Froggatt in the same islands of the Solomon group, thus establishing a probability of their being the same species. There is a decided difference in certain measurements, however, which makes it seem advisable to consider them distinct for the present. It seems quite possible that *C. solomonensis* Hill is synonymous with *C. pamuae* Snyder. If this is not true then *C. solomonensis* Hill must receive a new name, because of the priority of *C. solomonensis* Snyder. If *C. froggatti* proves to be separate we propose the name *C. hilli* for *C. solomonensis* Hill.

Had the authors known of Hill's paper, this paper would probably never have been written, but it would seem to present the necessary data to begin a revision of this tangle, and hence is presented for what it is worth.

	Northern Australia	Solomon Islands	N. Guinea	Solomon Islands	Solomon Islands	Solomon Islands
	<i>C. acinae- formis</i> Froggatt	<i>C. froggatti</i> sp. nov.	<i>C. doboni- cus</i> Oshima	<i>C. pamuae</i> Snyder	<i>C. solomon- ensis</i> Snyder	<i>C. grand- iceps</i> Snyder
Head length	1.63	1.58	1.63	1.35	1.8	1.7
„ breadth	1.31	1.256	1.39	1.15-1.2	1.45	1.45
„ index	0.800	0.791	0.850	—	—	—
„ contraction index	0.604	0.703	0.686	—	—	—
Gular index	2.42	2.16	3.03	—	—	—
„ contraction index	0.564	0.629	0.520	—	—	—
„ max. breadth index	1.88	2.01	2.30	—	—	—
„ min. „	3.33	3.19	4.42	—	—	—
Pronotal length						
„ (min.)	—	0.456	0.524	0.45	0.6	0.5
„ „ (max.)	—	0.502	0.575	—	—	—
„ breadth	—	0.958	1.103	0.75	1.0	1.0
„ index	—	2.00	2.007	—	—	—
Fontanel length	—	0.115	0.143	—	—	—
„ breadth	—	0.180	0.162	—	—	—
„ aperture index	—	0.639	0.882	—	—	—
Angle of inclination	30°	29°-31°	35°	—	—	—

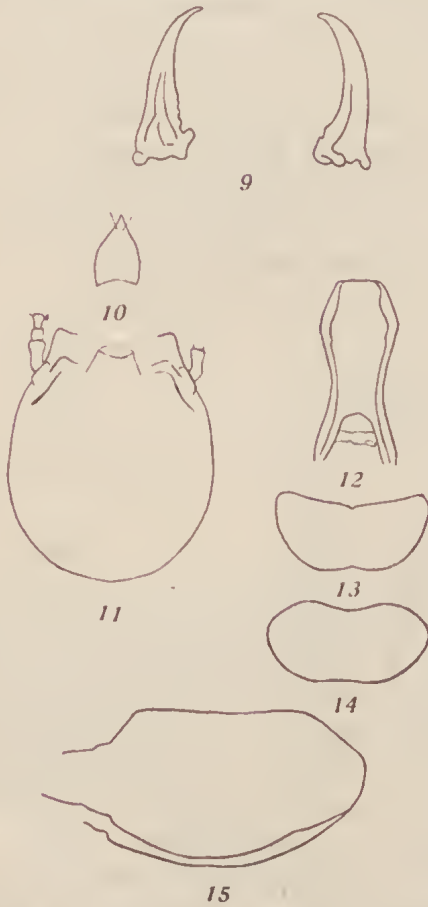
COPTOTERMES OSHIMAI, sp. nov.

Diagnosis.

Alates unknown.

Soldier.—Head index, 0.895; head contraction index, 0.595; gular index, 2.305; gular contraction index, 0.633; maximum

breadth index, 1.880; minimum breadth index, 2.969; fontanel aperture index, 0.613; angle of inclination, 27°-34°; pronotal index, 3.245.



Figs. 9—15. *Coptotermes oshimai*, sp. nov. $\times 24$.

9. Mandibles, dorsal view; 10. Labrum, dorsal view; 11. Head, dorsal view; 12. Gula, ventral view; 13. Pronotum with anterior margin upturned against the head; 14. Normal pronotum; 15. Head, profile view.

Description.

Soldier.—Slender and elongate. Head yellow-brown, somewhat darker near anterior margin; antennal foveae rimmed with darker chitin; mandibles yellowish basally, dark brown to nearly black in apical two-thirds; remainder of the body light creamy with the exception of a yellowish anterior portion and a dark yellow anterior margin on the pronotum and light yellow patches in the antero-lateral regions of the meso- and metanota.

Head with a few erect hairs; pronotum with a few stiff, seta-like hairs on the anterior angles and along the posterior margin, and a number of fine hairs on the anterior and lateral margins; meso- and metanota with a number of seta-like hairs along the lateral and posterior margins, and a few scattered ones on the disc; remaining somites to the ninth sparsely clothed with stiff hairs, those on the posterior margins being about three times as long as the others, and arranged in one row along the margin and a second, incomplete row within; ventral sclerites even more heavily clothed; terminal sclerites with a great number of long, fine hairs, and a few longer stouter ones. This pubescence of the abdomen is very noticeable, even under a hand-lens.

Posterior half of head almost hemispherical as viewed from above, the posterior outline smoothly and evenly rounded; sides of the head nearly parallel for a short distance, from about the basal two-fifths to the distal two-fifths; anterior to this converging sharply to a point just anterior to the antennal insertion, and from this point anteriorly less sharply convergent, resulting in a concavely arcuate outline from the anterior angles to the distal two-fifths, as shown in Fig. 11. Head in side view flattened or striated at the centre, somewhat wider distally; 2nd four-fifths as 15.)

Antennae 14-jointed, clavate; 1st joint cylindrical, slightly constricted at the centre, somewhat wider distally; 2nd four-fifths as wide as first, a little more than one-half as wide at base, two-thirds as wide at distal one-third; 4th subequal, to 3rd, hexagonal in profile, widest at centre; remaining joints successively larger to 12th, and more spherical; 13th somewhat less in diameter; 14th ovate, elongate, longer and narrower than preceding joints.

The antennal characters are very variable, especially in the region of joints 3 to 5, and the relative proportions of the segments are of very doubtful value in classification.

Mandibles dark brown, nearly black, curved at tip, the curve following back through practically the whole length; right with a very slightly crenulated biting edge near the base, and a small tooth at the position of the large basal tooth of the left mandible. Left with four even teeth, becoming progressively larger basally, and a large, rounded basal tooth (Fig. 9).

Labrum with sides broadly rounded, longer than broad, and broadest at about the middle; hyaline tip triangular, sharply pointed, projecting as a ridge dorsally, with two hairs at its base (Fig. 10).

Gula as shown in Fig. 12; front margin truncate, lateral angles rather sharply rounded, and the posterior margin rather more narrow than in most species.

Anterior margin of pronotum with a rather deep arcuation involving the median third; no sharp, median emargination; anterior margins round evenly on either side to the antero-lateral angles, at about the anterior third, thence the margins converge

CORRIGENDA.

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slightly concave dorsally, and rather pointed posteriorly (Fig